ENGINE COOLING AND NACELLE VENTILATION

The high case temperatures associated with the use of high pressure ratio engines require increased attention to the ventilation problem as a whole. Particular emphasis must be placed on provisions for maintaining adequate separation of hot metal and sources of combustibles. Other considerations of primary importance are:

a. Adequate cooling of engine and aircraft accessories

b. Control of cooling airflow in the event of fire

c. Protection of the wing and tank structure in the area above the tail pipes

d. Prevention of hazardous flow reversal conditions

Since some propeller slipstream energy is available near the blade roots under nearly all conditions the cooling system relies primarily on ram air for ground and flight operation. A tail pipe ejector is provided, however, to augment burner and turbine section cooling on the ground. The compressor compartment air outlets are located in the top of the nacelle thereby providing additional cooling for ground operation. Ventilated shrouds are being studied for use around the hot portions of the compressor case forward of the fire-seal.

Cooling air for the compressor compartment, compressor shroud, accessory cowl, bleed air heat exchanger, and alternator is taken in through a flush scoop at the forward end of the compressor compartment. The scoop is divided such that cooling air for the alternator is completely separated from air to the accessories and compartment proper. This precludes reverse flow which could possibly carry flammable vapors from the compartment through the alternator. The engine accessory cowl contains high pressure fuel lines and hence cooling air from this cowl is ducted overboard rather than being discharged into the compressor compartment.

Cooling air for the burner and turbine compartment is inducted through a second flush scoop and is discharged through the annular passage around the tailpipe. Air for the rear engine mount cooling jackets, however, is taken in and discharged through separate openings near the mounts.

All ducts which discharge air into fire zones are of fireproof construction and are provided with valves to shut off the flow of air in the event of fire.